

CLAIMS

1. High-density fissile material nuclear fuel,
5 characterised in that it is in the form of an assembly
(1) of elementary wires, most of which are constituted
by fissile material, wherein said wires are assembled
by stranding, braiding or weaving and said assembly is
contained in a stainless ductile casing, which
10 elementary wires are compressed by deformation of said
casing, and the elementary wires made of fissile
material are fine enough to allow for the size
accommodation of the fuel under the effects of
irradiation during burnup and for the gaseous fission
15 products to be removed.

2. Nuclear fuel according to the previous claim,
characterised in that the casing is deformed until the
gaps between the elementary wires occupy only 3 to 15 %
20 of the internal cross-section of the casing after
deformation.

3. Nuclear fuel according to any one of claims 1
or 2, characterised in that the casing is deformed so
25 that the cross-section of the elementary wires is
deformed, and the cross-sections of two adjacent wires
fit together.

4. Nuclear fuel according to any one of claims 1,
30 2 or 3, characterised in that the fissile material is
selected from the group including uranium, plutonium,

americium, their alloys or a combination of several of these elements.

5. Nuclear fuel according to the previous claim,
5 characterised in that said alloys are selected from the group including UMo and UAl.

6. Nuclear fuel according to either of claims 4 or
5, characterised in that the fissile material is a UMo
10 alloy comprising around 8 % by mass of molybdenum.

7. Nuclear fuel according to claim 1,
characterised in that the elementary wires have a
diameter between 10 μm and 100 μm .
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8. Nuclear fuel according to claim 1,
characterised in that the assembly of elementary wires
(6) consists only of wires having the same composition.

9. Nuclear fuel according to claim 1,
20 characterised in that the assembly of elementary wires
(6) consists of wires having different compositions.

10. Nuclear fuel according to either of claims 8
25 or 9, characterised in that the wires (6) have
identical diameters.

11. Nuclear fuel according to either of claims 8
or 9, characterised in that the wires (6) have
30 different diameters.

12. Nuclear fuel according to either of claims 8 or 9, characterised in that the assembly (1) of elementary wires has a braid form.

5 13. Nuclear fuel according to either of claims 8 or 9, characterised in that the assembly (1) of elementary wires has a strand form.

10 14. Nuclear fuel according to the previous claim, characterised in that the strand is a compound strand free of a central strand.

15 15. Nuclear fuel according to either of claims 8 or 9, characterised in that the assembly (1) of elementary wires is woven.

16. Method for producing a nuclear fuel according to any one of claims 1 to 15, which method includes the following steps:

- 20 - production of elementary wires (6) having a predetermined composition, most of which are wires of fissile material,
- production of at least one assembly (1) using said wires,
- 25 - placement of the assembly (1) in a stainless ductile casing (2),
- shaping of the filled casing.

17. Method for producing a nuclear fuel according to claim 16, in which the casing is a tube, there is

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only one assembly and it is shaped by drawing through a drawplate or by rolling.

18. Method for producing a nuclear fuel according
5 to claim 16, in which the casing is a tube, there is only one assembly, and it is shaped by roller burnishing.

19. Method according to claim 16, characterised in
10 that the casing is flattened and contains several assemblies placed parallel with respect to one another in a uniform manner, and the shaping of this casing thus filled is performed by pressing or rolling.